1990 - 1991 ANNUAL REPORT

ALBERTA AGRICULTURAL RESEARCH INSTITUTE

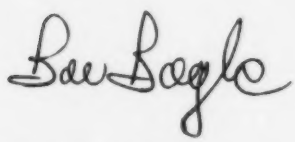
Alberta

92-05116/

To the Honourable Shirley McClellan
Associate Minister of Agriculture

In accordance with the requirements of the Alberta Agricultural Research Institute Act, I have the honour to present to you the Annual Report of the Alberta Agricultural Research Institute for the fiscal year 1990-91.

Respectfully submitted,



Bob Bogle, MLA
Chairman
Board of Directors

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Chairman's Report

I am pleased to present the fourth Annual Report of the Alberta Agricultural Research Institute.

The Institute's Board of Directors has much to be proud of in the many achievements of the 1990-91 fiscal year. This Crown corporation once again made impressive strides towards its goals of coordinating, promoting and supporting research in agriculture, and ensuring transfer of the resulting knowledge for the benefit of a viable and sustainable agri-food industry.

To me, the most important developments this past year were the final steps taken towards the merger of Farming for the Future with the Institute. Farming for the Future, an Alberta Heritage Savings Trust Fund Program, has generated many significant advances in agricultural research since it began operation 13 years ago. Under the merger, Farming for the Future will retain its research and demonstration programs, and its name, but will operate under the auspices of the Institute. The merger will streamline and strengthen the Alberta Government's support for agricultural research.

In 1990-91, the research related role of the former Alberta Agricultural Coordinating Committee (an advisory group for Alberta Agriculture) was transferred to the Institute. With this addition and the merger, the Institute will be the primary agricultural research granting and coordinating agency of the Government of Alberta.

While these landmark developments were taking place, the Institute continued to operate its three research funding programs: the Matching Grants Program, the Research Coordination Program and the Research Professorship Program.

The Matching Grants Program provides matching funds for research grants given by the private sector and qualifying public sector organizations. In 1990-91, 78 projects were granted a total of $1.688 million from the Institute and an amount equalling or exceeding $1.688 million from the private sector. Clearly, this program is meeting its goal of encouraging private sector support for agri-food research.

The Research Coordination Program promotes cooperation and the exchange of information and ideas among agricultural researchers. This past year, seven projects were granted a total of $33,600 under this program.

Under the Research Professorship Program, the Institute provides financial assistance to universities so they can intensify their research and teaching efforts in target disciplines. These are areas identified by the Board as being of special importance to the agri-food industry but are receiving limited attention at academic institutions. Four research professorships have been established under this program, three at the University of Alberta and one at the Western College of Veterinary Medicine.

The Board makes the final decisions on funding allocated under all the Institute's programs but it receives input from the Institute's expert committees. Until November 1990, the Institute had five research committees—Agricultural Processing, Diversification, Marketing, Production Efficiency and Resource Conservation—which reviewed all Matching Grants and

Research Coordination proposals and submitted their recommendations to the Board. In November, the committee structure was changed in anticipation of the merger with Farming for the Future. The new committee structure consists of six research committees, six On-Farm Demonstration committees and four strategic committees.

During 1990-91, the strategic committees provided valuable advice to the Board for the development of the Institute's strategic plan for 1992-1997. The strategies established by the Board for coordinating, promoting and supporting agricultural research and technology transfer will guide the Institute's future activities.

Also in 1990-91, the Board continued its review of agricultural research programs in the province. In this commodity-by-commodity review, agricultural researchers and producer organizations met with the Board. The researchers described their current and planned activities and the producer representatives identified their research priorities. This process helped the Board in making funding decisions and in determining future research priorities. In 1990-91, seven research reviews involving the following commodities/resources were held: grains, oilseeds, land and water, swine, horse, dairy and poultry.

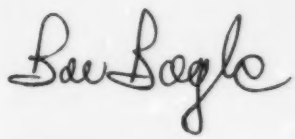
In addition to these ongoing reviews, the Directors also kept abreast of current research through reports and discussion documents, and by touring research facilities. In 1990-91, they toured the University of Alberta's Food Science Department in Edmonton and three facilities in Saskatoon: the Western College of Veterinary Medicine, the Veterinary Infectious Disease Organization and the Plant Biotechnology Institute of the National Research Council.

The Institute continued to administer the provincial portion of the National Agricultural Biotechnology Initiative, a federal-provincial program which supports commercialization of agricultural biotechnology products. The Board approved one project funded jointly with the National Agricultural Biotechnology Initiative and another province. As well, the Board administered grants given to it by private and public agencies in support of specific research projects.

There were changes on the Board of Directors in 1990-91. Mr. Bryan Perkins, a producer from Wainwright, resigned from the Board due to other commitments. I thank him for his important participation in our efforts. Four new directors joined the Board to help it accommodate changes arising from the merger of Farming for the Future with the Institute. Three of the new directors, Mr. Gail Fjordbotten of Granum, Mr. Jim Hole of St. Albert and Mr. Ben Schrader of Jarvie are former members of the Farming for the Future Council (the body which administered Farming for the Future). The other new director, Mrs. Ulla De Bruijn of Ponoka, served on the Red Deer Regional Review Committee of Farming for the Future's On-Farm Demonstration Program. I am very pleased to welcome these new Directors. I know the Board will benefit from their expertise and understanding of the research needs of Alberta's agri-food industry.

I would like to thank all the Directors of the Institute for their commitment to agricultural research. As well, the expert advice from the Institute's committees was invaluable. A special thanks to our Executive Director, Dr. Ralph Christian, and his staff at Alberta Agriculture's Research Division for administering the day-to-day activities of the Institute. My thanks also go to all the researchers who dedicated their efforts to the advancement of Alberta's agri-food industry. The Institute's substantial progress during the four years since its creation has been built upon the energy and commitment of these people.

In a very short time, the Alberta Agricultural Research Institute has taken a leading role in coordinating, promoting and supporting agriculture and food research. And research is a key factor in maintaining a sustainable agri-food industry which will benefit Alberta producers, processors and consumers.



Bob Bogle, MLA
Chairman
Board of Directors

Executive Director's Report

The Alberta Agricultural Research Institute achieved many notable results in 1990-91. The restructuring of its committees to accommodate the merger of Farming for the Future, the growth in private sector support for agri-food research and the creation of the Institute's five-year strategic plan were some of the year's landmark developments.

Farming for the Future is an Alberta Heritage Savings Trust Fund program which has been supporting agri-food research for over a decade. The merger of Farming for the Future with the Institute strengthens and streamlines the Alberta Government's support of agricultural research. In anticipation of the merger, the Institute's existing committee structure was expanded in 1990. There are now six research committees which review funding proposals submitted to the Institute, four strategic committees which advise the Board of Directors on research prioritization and planning, and six On-Farm Demonstration committees which review technology transfer proposals.

With the merger, the Institute is now the Alberta Government's foremost agricultural research support agency. The progress achieved to date by the Institute is the product of the efforts of its 22 Directors and more than 140 committee members. The Directors and committee members include producers, processors, researchers and government representatives. Together, they bring a truly impressive depth and breadth of knowledge to the Institute's activities.

Just as crucial has been the growing role of the private sector in funding and initiating agricultural research. In 1990-91, and every year since the start of the Institute's Matching Grants Program, the funds contributed by the private sector have increased. Private industry has also been quite effective in making its research needs and concerns known during the Institute's ongoing review of agricultural research activities. I was especially impressed this past year by the considerable commitment shown by producer organizations attending a meeting on ways to enhance applied research and technology transfer.

Input from the private sector, researchers, research administrators, the strategic committees and the Board of Directors was very helpful in the development of the Institute's Strategic Plan for Agri-Food Research covering the period from 1992-93 to 1996-97. Based on this plan, the Institute's activities will focus on: advancing the agri-food industry; increasing the industry's ability to compete globally; improving the industry's environmental sustainability; and enhancing food quality, nutritional value and safety. The Institute's strategic plan was developed in harmony with Alberta Agriculture's strategic plan, ensuring that the two agencies will work towards their complementary goals with compatible approaches.

Although 1990-91 was a demanding year, the Alberta Agricultural Research Institute continued to make remarkable progress. Under the guidance of the Institute, with its able Chairman, Mr. Bob Bogle, and its dedicated Board, agricultural research in Alberta is helping to make the province's agri-food industry dynamic and competitive now and in the 21st century.

R.G. Christian, DVM
Executive Director

Introduction

The Alberta Agricultural Research Institute is a Crown corporation created by an Act of the Alberta Legislature in 1987. It reports to the Legislature through the Associate Minister of Agriculture and is governed by a Board of Directors appointed by the Associate Minister.

The goals of the Institute are to coordinate, promote and support agricultural research, and to ensure the transfer of the research results to promote a viable and sustainable agri-food industry. The Institute funds priority research efforts through several programs: the Matching Grants Program, the Research Coordination Program, the Research Professorship Program and Alberta's portion of the National Agricultural Biotechnology Initiative. It also informs producers about the results of agricultural research through various publications and a computerized data base.

In 1990-91, the Institute granted over $1.7 million to projects supported under its funding programs. Also in 1990-91, the final steps were taken to merge Farming for the Future, an agricultural research funding program, with the Institute. With the merger, the Institute becomes the primary agricultural research granting and coordinating agency of the Alberta Government.

Research is finding ways to increase the quality and yields of a wide variety of Alberta crops.

Organization

The Alberta Agricultural Research Institute is composed of a Board of Directors, expert committees and an administrative unit. The Board conducts the affairs of the Institute. The expert committees review and provide recommendations to the Board on research and technology transfer proposals, and assist the Board in esearch coordination, priority setting and planning. The Institute's day-to-day administration is carried out by the Research Division of Alberta Agriculture. The Board has appointed the Division's Executive Director as the Institute's Executive Director.

Board of Directors

The 22-member Board of Directors is appointed by the Alberta Associate Minister of Agriculture. It is composed of agricultural producers and representatives of agri-business and various governmental and academic agencies. The Institute's Act specifies that certain agencies must be represented on the Board: Alberta Agriculture; the Faculty of Agriculture and Forestry, University of Alberta; Agriculture Canada; the University of Calgary; the Western College of Veterinary Medicine; Alberta Advanced Education; either Alberta Technology, Research and Telecommunications or the Alberta Research Council; and the Legislative Assembly of Alberta. The Board's wide range of representation is designed to assist in the promotion and coordination of agri-food research in the province.

In 1990, four new Directors were added to facilitate the merger of Farming for the Future with the Institute. Farming for the Future is an Alberta Heritage Savings Trust Fund program which has funded agricultural research projects since 1979. The Board has always worked closely with the Farming for the Future Council, the body which administered Farming for the Future. The formal merger, effective on April 1, 1991, will enhance coordination of Farming for the Future programs with the other programs of the Institute. The four new Directors all have experience in the administration of Farming for the Future and will help to ensure that the merger takes place without any disruption in the activities of Farming for the Future or the Institute.

The Board provides recommendations to various national and provincial agencies on research priorities. The research related advisory role of the former Alberta Agricultural Coordinating Committee (an advisory group for Alberta Agriculture) was added to the Institute in 1990-91. With this addition, the Institute became the province's primary agricultural research coordinating agency.

To improve research coordination and priority setting, the Board is conducting a sector-by-sector review of agricultural research, called the Agricultural Research Programs Review. In 1990-91, seven research areas were reviewed: grains, oilseeds, land and water, swine, horse, dairy and poultry. The information from these sessions assists the Board in making decisions on funding and priority setting. The sessions also provide an opportunity for researchers and research users to meet and discuss issues and directions.

The Board makes funding decisions on applications submitted under the Matching Grants Program, the Research Coordination Program, the Research Professorship Program anJ Alberta's portion of the National Agricultural Biotechnology Initiative. The Board also administers funds from outside agencies for specific research projects.

To enhance the Institute's efforts, the Board developed a five-year strategic plan for its activities. The plan identifies five target areas: agricultural marketing research; agricultural processing research; resource conservation and sustainability research; agricultural production research; and technology transfer and utilization. The strategies established to fund, coordinate and facilitate efforts in these five areas will guide the Institute's activities to 1997.

Committees

The Board receives advice and recommendations from its various committees. Each Strategic and Research committee is chaired by a member of the Board. Committee members can include other members of the Board, a representative from Alberta Agriculture, representatives from other government and academic agencies, and agricultural producers and/or processors. Members are recommended by the committee's chairman and appointed by the Board.

Until November 1990, the Institute had five research committees: Production Efficiency; Agricultural Processing; Marketing; Resource Conservation; and Diversification. These committees reviewed the funding proposals for the Matching Grants and Research Coordination Programs in 1990-91 and advised the Board on research coordination and priority setting.

In November, the committee structure was changed in preparation for the merger of Farming for the Future with the Institute. The new structure consists of six research committees, four strategic committees and six On-Farm Demonstration committees. A significant number of the people who served on Farming for the Future's Research Program committees have been appointed to the Institute's research and strategic committees.

The new research committees are: Beef and Dairy; Pork, Poultry, Sheep and Other Livestock; Cereals and Oilseeds; Forages, Pulse, Vegetables and Other Crops; Resource Conservation; and Policy, Economics and Marketing. In 1990-91, these committees reviewed and made recommendations to the Board on proposals submitted to the Farming for the Future Research Program. Starting in 1991-92, the committees will review proposals submitted for all the Institute's research programs. They may also examine long-term funding priorities in specific areas and make recommendations to the strategic committees and the Board.

The strategic committees are: Production, Processing, Marketing, and Sustainable Development and Conservation. They advise the Board on research priorities, emerging opportunities and long-term planning. In 1990-91, they worked with the Board to develop the Institute's five-year strategic plan.

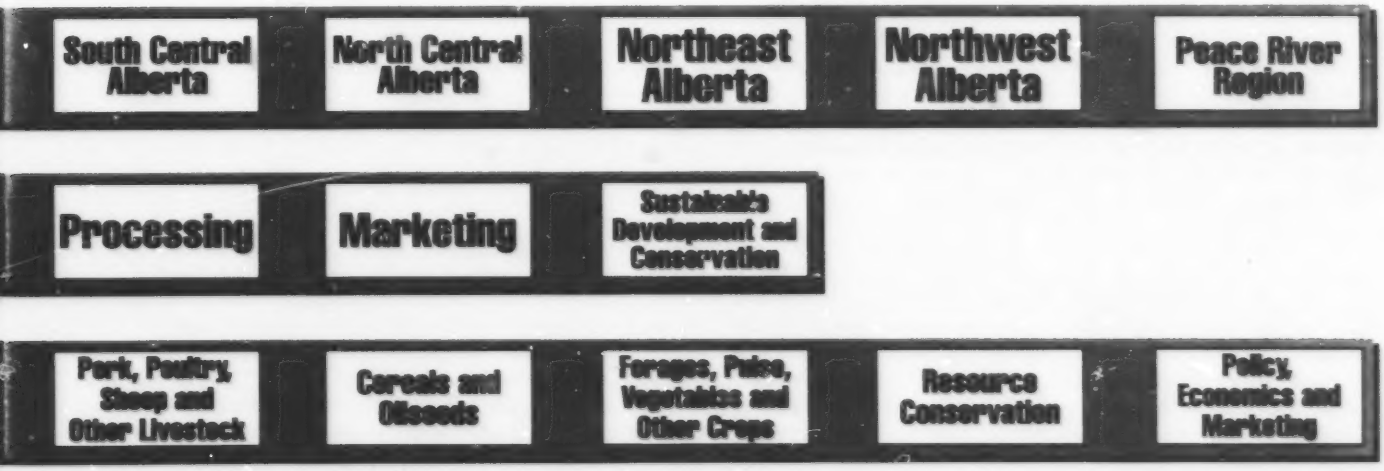
The committee structure for the On-Farm Demonstration Program remains as it was under the Farming for the Future Council, with six regionally based committees: Southern Alberta; South Central Alberta; North Central Alberta; Northeast Alberta; Northwest Alberta; and the Peace River Region. These committees review demonstration proposals from their regions and submit their recommendations to the Board.

Administrative Support

Alberta Agriculture's Research Division provides administrative services to the Institute. To maintain continuity following the merger, administrative staff employed by Farming for the Future now work under the Institute. The Institute also employs one full-time staff member to assist in financial and administrative duties.

The Division maintains the Institute's financial records, processes grant applications and prepares reports on the Institute's funding programs and background materials for committee and Board meetings. Staff also prepare discussion documents, compile submissions and summarize the information brought forth at the sessions held under the Agricultural Research Programs Review.

The Division also publishes material for producers, processors and the general public concerning agricultural research and the Institute. This past year, it produced the Institute's *1989-90 Annual Report*, issues of *Research Report* and news releases.



Funding Programs and Project Support

The Institute has three funding programs: the Research Coordination Program, the Matching Grants Program and the Research Professorship Program. It also administers Alberta's portion of the National Agricultural Biotechnology Initiative, and in 1991 it began administering the Farming for the Future Program.

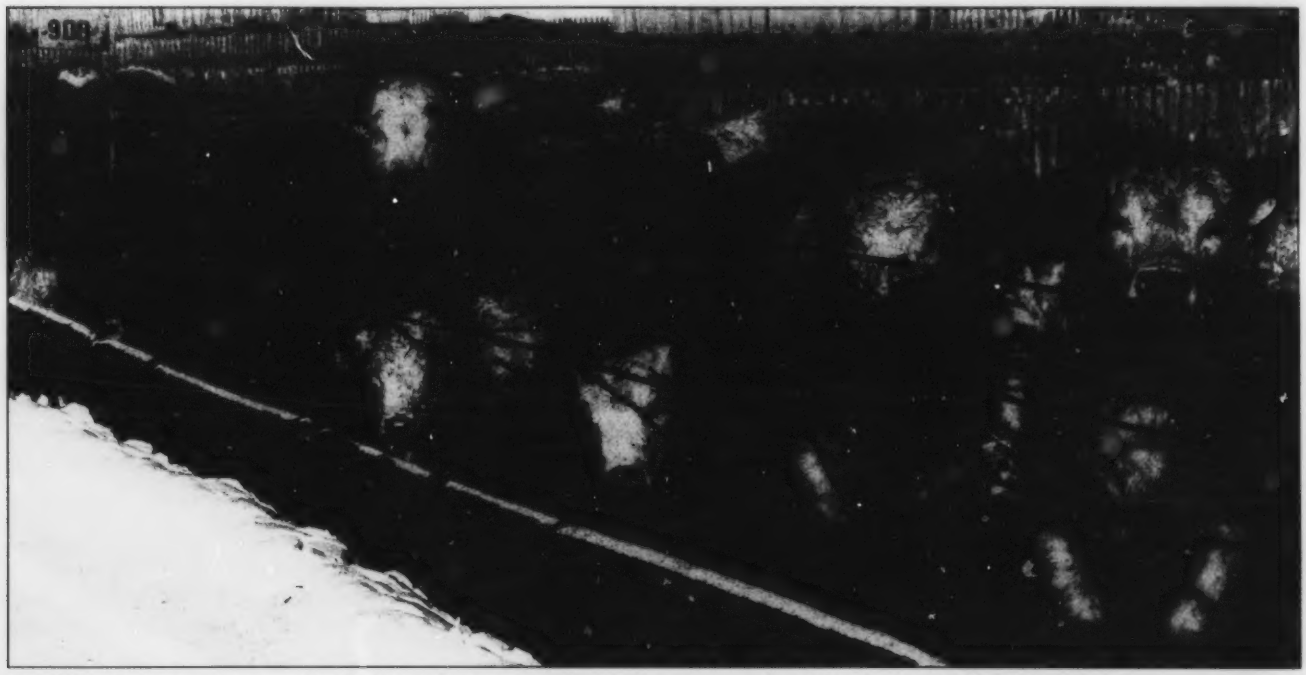
One Research Coordination project investigated methods to improve the quality, palatability and consumer acceptance of meat and processed foods.

Research Coordination Program

The Research Coordination Program is designed to enhance communication and coordination between researchers. Such communication reduces unnecessary duplication of efforts and increases information sharing. Funds under this program are granted for the costs of increased cooperation such as travel to annual research review and planning meetings, inter-laboratory exchanges, and scientific seminars.

This past year, seven Research Coordination projects were supported with $33,600 from the Institute (see page 11 for a list of these projects). In one project, an interagency, interdisciplinary team of researchers investigated methods to extend the shelf life of red meat, poultry and processed foods. The goals of this effort are to make Alberta's agri-food industry more competitive in distant markets and to improve the quality, palatability and consumer acceptance of these products in domestic markets. Researchers at each of the three agencies involved in the project—Agriculture Canada, the University of Alberta and the University of Saskatchewan—studied various aspects of this complex topic. They meet regularly to plan and coordinate activities and discuss results. They also work closely with the processing industry to facilitate technology transfer.

In another project, researchers from Agriculture Canada, Alberta Agriculture and the University of Alberta met to discuss their research activities in soil and water engineering. They also held workshops on such topics as: optimum seedbed conditions for crops; soil and water conservation techniques; methods of seeding, fertilizing and pesticide application; and soil compaction. By working together, these researchers are improving coordination through sharing information and ideas. As well, the researchers are working more closely with University of Alberta graduate students, ensuring that the next generation of scientists is at the forefront of knowledge in the field of soil and water engineering.



Matching Grants projects are developing techniques to improve disease control and diet for beef and dairy cattle.

Matching Grants Program

The Matching Grants Program stimulates private sector support for agricultural research by matching, usually on a 50:50 basis, grants from industry for approved research projects. The program also provides matching funds for projects carried out jointly with federal agencies and agencies of other provinces.

To qualify for funding, researchers must have obtained support from an eligible source, including private companies, foundations, individuals and non-Alberta Government agencies. Priority is given to matching funds from the private sector. Funds from federal agencies must be "new" dollars, that is, not redirected from an existing program or funding already applied to Alberta.

The Matching Grants Program has been very effective in stimulating private sector support for agricultural research since the program started in 1988-89. That year, the private sector contributed nearly $1.09 million to Matching Grants projects, and in 1989-90, it contributed $1.14 million. In 1990-91, the funds from the private sector will equal or exceed $1.688 million. The rise in funding during 1990-91 is in part because the projects approved in that year were supported for 15 months rather than the normal 12 (the funding year is being converted from a calendar year to the provincial government's fiscal year).

In 1990-91, a total of $1.688 million was awarded by the Institute to 78 Matching Grants projects on a wide range of subjects (see pages 12 to 22 for a complete list of these projects). Topics under investigation include: improving disease control and diet for beef and dairy cattle; controlling insect pests like grasshoppers and Russian wheat aphids; processing meat to suit the tastes of the Japanese market; increasing the yield and quality of cereal and oilseed crops; improving management of irrigation canals; increasing egg and poultry production through improved disease control and better rations; and improving protective clothing for farm workers.

Forage crops are the major feed for beef cattle in Alberta. Alfalfa-bromegrass mixtures produce high quality forage, with reduced soil nitrogen requirements and a long grazing season. However, yields of these mixtures are usually lower than yields of either component grown alone, and the alfalfa component is depleted over time. One study is working to improve the yields and longevity of these stands.

Another project is examining the effects of omega-3 fatty acids found in certain foods. Some research has indicated that these fatty acids may help in the prevention of cardiovascular disease, diabetes, rheumatism and other diseases, especially when these fatty acids are taken in modest amounts in diets which contain saturated fats like those in dairy products. If these results are confirmed, people susceptible to a variety of diseases could benefit.

Windbreaks along field boundaries reduce wind speeds, and thereby reduce soil erosion and enhance soil moisture levels. Natural windbreaks, composed of trees and shrubs, take several years to become established and need intensive management in those early years. One study is assessing newly available nylon windbreaks. These windbreaks can be assembled in a day and, if proven to be as effective as natural windbreaks, they could offer a convenient alternative.

Research Professorship Program

The purpose of the Research Professorship Program is to raise the research priority of target disciplines and to intensify the research efforts directed towards these disciplines at specific academic institutions. The program also provides a means of attracting renowned scientists to western Canada as well as facilitating the training of new scientists.

Each professorship is funded for a three-year term. The chosen candidate conducts research and educates other individuals in that particular specialty. The institutions receiving funds are encouraged to provide any additional funds needed for technical manpower, equipment, supplies and other costs.

A Research Professorship in Animal Welfare/Ethology has been established at the Western College of Veterinary Medicine, and three Professorships have been established at the University of Alberta in: Food Packaging and Preservation; Marketing of Value-Added Agricultural Products; and Soil Conservation. In addition, the Canada/Alberta Soil Conservation Initiative has contributed financial support for the Soil Conservation Research Professorship and for a multi-agency, province-wide soil conservation study which is being conducted in conjunction with the Soil Conservation Professorship.

National Agricultural Biotechnology Initiative

Announced in 1987, the National Agricultural Biotechnology Initiative is designed to assist the private sector in agricultural research directed at the development and commercialization of new biotechnology products. The Initiative is being jointly operated by the federal government and the four western provinces. The total cost to the federal government is estimated at $25 million. The provinces contribute matching funds for projects approved in their jurisdictions. The Initiative was created with a three-year term, and an extension is currently under discussion.

The Institute's Board administers Alberta's participation in the program. In 1990-91, the Board approved $60,000 for one project funded jointly with the federal government and the province of Saskatchewan. The Institute's total commitment for this project is $213,750 over four years.

Farming for the Future Program

In 1990-91, the final steps were taken to merge Farming for the Future, an Alberta Heritage Savings Trust Fund program, with the Institute. Farming for the Future has supported research since 1979 and has generated many valuable advances with potential economic benefits to the agri-food industry, consumers and the provincial economy as a whole. The total benefits are estimated to exceed $900 million over the next 25 years. Under the merger, Farming for the Future retains its Research and On-Farm Demonstration Programs, and its name, but operates under the auspices of the Institute. Farming for the Future's annual activities are described in detail in a separate report.

The Board's first decisions on Farming for the Future funding allocations were made in February 1991 for projects which will be conducted in 1991-92. The Board awarded $3.986 million to 105 research projects.

RESEARCH COORDINATION PROJECT SUMMARIES 1990 - 1991

Project Title And Objective	Researcher	Institution and *Location*	AARI Funding 1990-91
AGRICULTURAL PROCESSING **Interagency, Interdisciplinary Research to Extend Chilled Storage Life of Meat, Poultry and Processed Products** • to launch a concerted, comprehensive, interagency, interdisciplinary research effort on extending refrigerated storage life so that lower cost sea transport can be used by Alberta and Saskatchewan food processors to help their competitiveness in exporting chilled meat products to remote markets.	L. Jeremiah	Agriculture Canada *Lacombe*	5,000
DIVERSIFICATION **The Future of Prairie Agriculture** • to look at the future of Western Canadian agriculture and to coordinate appropriate research and development programs on topics such as markets, production systems, communities and climate.	P.J. Martin	University of Alberta *Edmonton*	5,000
PRODUCTION EFFICIENCY Proposed All-Alberta Applied Statistics and Biometrics Workshop • to compile a mailing list of statisticians and biometricians working in Alberta; and to organize a workshop for these specialists.	L. Florence	Alberta Environmental Centre *Vegreville*	5,000
Coordination of Mastitis Research in Agriculture Canada (Lethbridge) and the University of Calgary • to coordinate studies on the causes of mastitis at the University of Calgary with dairy herd studies at the Agriculture Canada Research Station in Lethbridge and the results of field studies throughout southern Alberta.	K.J. Cheng	Agriculture Canada *Lethbridge*	3,600
Crop Molecular Biology and Biotechnology in Alberta: A Workshop to Review and Plan Brassica Research • to bring together Alberta researchers working on crop molecular biology and biotechnology, especially in relation to oilseeds, to discuss research objectives and the techniques utilized to meet these objectives.	A.M. Johnson-Flanagan	University of Alberta *Edmonton*	5,000
RESOURCE CONSERVATION **Coordination of Soil and Water Engineering Research in Alberta** • to coordinate the research activities at the University of Alberta and Agriculture Canada in the study of optimum seedbed conditions for cereals, oilseeds and special crops, methods of seeding and fertilizer application, soil compaction, and soil and water conservation.	K. Domier	University of Alberta *Edmonton*	5,000
Soil Fauna and Structural Development Under Different Tillage and Cropping Systems in the Peace River Region • to integrate farmers' experiences with research results and to promote interactions between university staff, producers and scientists concerning tillage and cropping systems in the Peace River region.	M. Arshad	Agriculture Canada *Beaverlodge*	5,000

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
AGRICULTURAL PROCESSING				
Optimization of Modified Atmosphere Packaging to Extend the Market Life of Meat and Meat Products • to determine the optimum modified atmosphere for market life extension of a range of meats and meat products prepared as sandwiches; and to determine the microbiological safety of products that have been seeded with pathogenic bacteria and stored under conditions simulating good and abusive storage.	M. Stiles	University of Alberta *Edmonton*	Gainers Ltd., Quality Fast Foods, Centennial Packers	34,126
Research and Development of UHT Whipping Cream with an Extended Shelf Life • to study the effect of milk quality and selected variables on the physical and chemical characteristics of fresh cream and storage stability of UHT whipping cream.	L. Ozimek	University of Alberta *Edmonton*	Palm Dairies Limited	14,250
Optimization of Post-Mortem Technology for Quality Assurance in the Processing of Beef • to develop a quality assurance program for the post-mortem treatment of beef by investigating several factors which affect its palatability.	S. Morgan Jones	Agriculture Canada *Lacombe*	Alberta Cattle Commission	18,000
The Enhancement of Marbling Fat to Meet Japanese Specifications for High Quality Beef • to develop a strategy that will help Alberta farmers to produce the highly marbled beef needed to meet Japanese import specifications.	S. Morgan Jones	Agriculture Canada *Lacombe*	Canada Packers Inc.	40,500
Evaluation of Potential Beneficial Effects of Dietary Omega-3 Fatty Acids • to demonstrate the ability of omega-3 fatty acids in lowering blood lipid level when consumed in moderate amounts with diets containing saturated fats.	M. Clandinin	University of Alberta *Edmonton*	Canadian Dairy Bureau	97,750
Development of Criteria for Product Temperatures During Storage and Distribution of Chilled Beef • to obtain and analyze representative beef storage and distribution temperature histories, identify aspects of current systems that reduces storage life and formulate realistic time/temperature criteria and guidelines for better storage, transport and handling of beef.	C.O. Gill	Agriculture Canada *Lacombe*	Canada Packers Inc., Lakeside Research, Cargill Foods	15,000
Selection of Diets to Enhance Pork Quality, with Emphasis on PSE • to evaluate the effect of sodium bicarbonate and ammonium chloride on PSE incidence and meat quality; identify diets that enhance or reduce PSE incidence; and develop improved processing procedure for PSE pork.	J.G. Patience	Prairie Swine Centre *University of Saskatchewan*	Church and Dwight Inc., Saskatchewan Agriculture Development Fund, Ontario Pork Industry Improvement Program	15,000

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
DIVERSIFICATION				
Technological, Biochemical and Nutritional Aspects of Production of Allergy-Free Infant Formulae Based on Cow's Milk • to apply recent technological processes to produce allergy-free infant formulae based on cow's milk.	L. Ozimek	University of Alberta *Edmonton*	Alberta Dairymen's Association	25,820
High Quality Semidwarf Winter Wheats for Southwest Alberta • to identify hard red winter wheats that are high yielding, hardy, stiff-strawed and high quality.	J. Thomas	Agriculture Canada *Lethbridge*	Alberta Winter Wheat Association, Beswick Farms	6,175
Oilseed Diversification by Metabolic Engineering of Canola • to isolate genes and regulatory elements which cause lipid body proteins to be produced in canola seed, and to use the knowledge gained in the development of new industrial products from currently grown oilseeds.	M. Moloney	University of Calgary *Calgary*	La Societe Nationale Elf Aquitaine	30,000
Multi-location Trials of Selected Grass Lines Suitable for Rangeland Rehabilitation • to conduct multi-location evaluation trials for the possible registration of selected lines of slender wheatgrass, broadgrass, wheat grass and alpine bluegrass as reclamation varieties in Alberta.	R. Hermesh	Alberta Environmental Centre *Vegreville*	Canadian Parks Service	5,000
Utilization of Flax Straw for Building Panels and Furniture • to determine suitable handling and processing mechanisms for flax and flax fibre; investigate possible utilization and economies of flax straw for the production of construction panels, furniture, and other molded products or composite materials as well as test panel's suitability for building purposes.	K.W. Domier	University of Alberta *Edmonton*	Prairie Farm Rehabilitation Administration	10,000
The Retention and Movement of Chemicals Applied to Sand Based Greens • to evaluate the degree to which the USGA green can retain and utilize fertilizers and other chemicals without contributing to the environmental problem of pollution.	H. Knowles	Prairie Turfgrass Research Centre *Olds*	Alberta Turfgrass Research Foundation	11,225
MARKETING				
Application of Ultrasound and Image Analysis Technology to the Determination of Body Composition of Live Cattle • to determine correlation accuracy between live animal subcutaneous backfat, longissimus dorsi muscle cross-sectional area and marbling using ultrasonography; determine inheritance of carcass traits and develop prediction equations for estimating total red meat yield and body fat composition at specific points; assess the predictability of carcass composition of progeny having a range of marbling ability and test blood samples to investigate gene complex(s) associated with carcass composition in cattle.	R.C. Bailey	Agriculture Canada *Lethbridge*	Canadian Hereford Association, Canada Packers Inc., Charolais Association, Saskatchewan Wheat Pool	43,000

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
PRODUCTION EFFICIENCY				
Spread and Survival of Toadflax Growing on Cropped or Fallow Land • to determine seed production per shoot of toadflax; and to study seed dormancy and viability of toadflax plants.	J. King	University of Alberta *Edmonton*	Western Grains Research Foundation	15,000
Understanding and Alleviating Green Seeds in Spring Canola • to assess the impact of frost and freezing tolerance on the degreening process during seed maturation in *Brassica napus* and *B. campestris*.	A.M. Johnson-Flanagan	University of Alberta *Edmonton*	Western Grains Research Foundation	15,000
Epidemiological Investigation of the Pattern of Shipping Fever Within Sale, Transport and Feedlot Groups • to describe how the pattern of shipping fever is influenced by auction market, transportation and feedlot pen conditions; to determine if shipping fever is communicable from calf to calf within transport trucks, or within large pens at the feedlot; and to develop clinical trial designs which will help to improve future commercial efficacy tests of shipping fever vaccines and other preventive measures.	C. Ribble	Western College of Veterinary Medicine *Saskatoon*	Agriculture Canada, Ontario Cattlemen's Association	2,000
Influence of Bovine Somatotropin Injection on Nutritional Requirements, Metabolic Responses, Milk Quality and Reproduction in Dairy Cows • to determine the influence of long-term bovine somatotropin (BST) injection on nutritional requirements of dairy cattle, milk yield and composition, biological efficiency of milk production, reproductive performance and the productive life of dairy cows.	J. Kennelly	University of Alberta *Edmonton*	Cyanamid Canada Inc.	71,000
Development, Enhancement and Evaluation of Alberta Protein Sources for Cattle • to develop and enhance various protein sources; and to evaluate the resulting protein sources and other protein sources which are currently under-used.	J. Kennelly	University of Alberta *Edmonton*	Cyanamid Canada Inc., Canola Council of Canada, The Flax Council of Canada, Imperial Oil Limited	80,000
Nutritional, Physiological and Microbial Factors that Contribute to Productive Efficiency in Dairy Cows • to determine the microbial and physiological basis for individual differences in feed utilization between high- and low-producing dairy cows; and to determine the feeding value of various alternative feedstuffs that have potential to enhance milk production level and efficiency, milk composition and rumen characteristics in high-producing dairy cows.	L. Rode	Agriculture Canada *Lethbridge*	Alberta Milk Producers Association Ltd., Alberta Cattle Commission	30,000
New Tools to Reduce the Risk of Shipping Fever • to develop improved methods of predicting which cows are susceptible to bovine respiratory disease (BRD) so that preventive measures can be targeted to high risk groups; to detect clinically ill calves so treatment can be started; and to predict the outcome of disease so managers can decide whether treatment is worthwhile.	M. Campos	Veterinary Infectious Disease Organizaton *Saskatoon*	Alberta Cattle Commission	36,750

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
Development of a Vaccine for Colisepticemia in Turkeys • to identify the strain of *Escherichia coli* causing the respiratory disease colisepticemia and to genetically alter these bacteria to produce a vaccine which can be delivered to turkeys in their drinking water.	A. Potter	Veterinary Infectious Disease Organization *Saskatoon*	Saskatchewan Turkey Producers Marketing Board, Veterinary Infectious Disease Organization	37,050
New Concepts in Feeding Growing-Finishing Pigs • to test if pigs will voluntarily vary protein intake independently of energy intake, and to test the new 'Feed Intake Recording Equipment'(FIRE) which allows recording the feed intake of each pig in a group of 10 to 15 pigs.	F. Aherne	University of Alberta *Edmonton*	Pig Improvement Canada Ltd., Heartland Lysine, Inc., Alberta Pork Producers Development Corporation	16,932
Biological Evaluation of Full-Fat Oilseeds (Canola, Flax) as High Energy, Protein and Omega-3 Fatty Acid Ingredients in Poultry Feeds • to screen and assess the nutritional values of dietary omega-3 fatty acid rich feed ingredients including full-fat canola, flax and soybean seeds; to study eggs and egg products thus enriched with omega-3 fatty acids for their potential to reduce cholesterol in humans; and to develop practical least-cost feed formulae for poultry with full-fat oilseeds.	J. Sim	University of Alberta *Edmonton*	The Ontario Egg Producers Marketing Board, The Flax Council of Canada	22,117
Improving Reproductive Efficiency in Broiler Breeder Hens • to gain knowledge of how the normal reproductive system of the broiler breeder hen is disrupted by obesity, aging, and environmental factors such as water quality; and to determine the effects of feed restriction during various growth stages.	F. Robinson	University of Alberta *Edmonton*	Indian River International, New-Life Feeds, Lilydale Co-operative Limited	17,500
Control of *Listeria monocytogenes* in Raw Milk • to determine the origin of the potentially disease causing organism *Listeria monocytogenes* in raw milk; and to determine which sources act as the reservoir for contamination of the bulk tank milk.	H. Jackson	University of Alberta *Edmonton*	Alberta Milk Producers Society, Palm Dairies Limited	6,050
Heat Resistance of *Listeria monocytogenes* • to determine the factors related to increased heat resistance of *Listeria monocytogenes* which in turn allows some of these bacteria to survive normal pasteurization procedures.	H. Jackson	University of Alberta *Edmonton*	Palm Dairies Limited	6,600
Disease Elimination by Tissue Culture and Testing of Potato Breeding Clones • to ensure that clones received from breeding programs in the United States are disease free; and to develop a source of disease tested seed tubers of these clones for evaluation in the prairie regional trial system of adaptation trials and eventually by the industry.	D. Lynch	Agriculture Canada *Lethbridge*	Alberta Potato Research Association, Saskatchewan Agriculture Development Fund, Manitoba Vegetable Producers Marketing Board	20,000
Genetic Manipulation of Cellulolytic Rumen Microorganisms to Improve Low Quality Feed Digestion in Ruminants • to identify and enhance species of rumen fungi most active in cellulose digestion in a wide variety of ruminant animals maintained on low quality feeds, and to use the most active ones to feed to newborn ruminants to improve their capacity to utilize low cost and low quality forage.	K.J. Cheng	Agriculture Canada *Lethbridge*	National Biotechnology Strategy Fund	42,600

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
Increasing Litter Size Born by Dietary Supplementation of Canola Oil in Early Gestation • to study the effects of supplementing the diets of pregnant sows during early gestation with canola oil on litter size at farrowing.	F.X. Aherne	University of Alberta *Edmonton*	Alberta Pork Producers Development Corporation	10,063
The Variability of Amino Acid Digestion in Feed Ingredients for Growing Pigs • to determine the variability in digestible amino acid supply in commonly used feed ingredients in diets for growing pigs in Western Canada and develop and ascertain the validity of the "ideal mobile nylon bag technique" for the rapid determination of ideal amino acid digestibilities in feed ingredients for pigs.	W.C. Sauer	University of Alberta *Edmonton*	Heartland Lysine Inc.	13,945
The Nutritive Value of Extruded Full-Fat Canola and Soybeans in Diets for Early-Weaned Pigs • to determine the nutritive value and digestible protein, amino acid, energy and fat content of the extruded full-fat canola and soybeans in diets for early weaned pigs.	W.C. Sauer	University of Alberta *Edmonton*	Ralston Purina Canada Inc.	8,749
An Integrated Pest Management Program for the Control of Tracheal Mites *Acarapis woodi* • to control tracheal mites using natural products such as formic acid, drone brood phermone and ketones; limiting the use of chemicals to control other diseases; standardize computer-controlled indoor wintering technique and monitor disease and honey bee's nutritional and patho-physiological states by using high tech equipment.	T.P. Lui	Agriculture Canada *Beaverlodge*	Alberta Beekeepers Association, Bee Maid	21,000
The Disinfection of Honey Bee Equipment and Hive Products Using Gamma Irradiation • to determine the efficiency of using gamma irradiation to disinfect contaminated bee hive equipment and hive product and conduct biological, gas chromatographic, mass spectrometric and HPLC analysis to measure the quality of pollen and beeswax following disinfection using the irradiation method.	T.P. Lui	Agriculture Canada *Beaverlodge*	Ontario Beekeepers Association	5,000
Enhancement of Canola Seed Quality by Manipulation of Date to Flowering • to identify highly florigenic and stem elongating gibberellins (GAs), demonstrate the effects of exogenous application of these GA classes, and utilize those gibberellins to facilitate the identification of genes which are differently expressed during the initiation of flowering in canola.	R.P. Pharis	University of Calgary *Calgary*	Abbott Laboratories	15,000
Development of an Enzymatically Linked Immunoassay (ELISA) for the Diagnosis of Equine Arteritis Virus in Horses • to conduct an in-depth study and modify the enzyme linked immunosorbent assay (ELISA) for the possible replacement of currently used tissue culture based virus neutralization tests.	C. Darcel	University of Lethbridge *Lethbridge*	Palliser Animal Health Laboratories	9,000

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
Control of Bovine Viral Diarrhea-Mucosal Disease Syndrome: Production of Novel BVDV Vaccines • to produce a safe and effective BVDV vaccine using genetic engineering techniques to prevent respiratory disease in young animals and fetal infections in pregnant dams.	T.J. Zamb	Veterinary Infectious Disease Organization *Saskatoon*	Cattle Marketing Deduction Fund	49,750
Control of Blackleg of Canola • to determine timing of foliar fungicidal spray for the control of blackleg and measure the influence of zinc on blackleg severity using two cultivars of canola.	P.D. Kharbanda	Alberta Environmental Centre *Vegreville*	Canola Council of Canada, Alberta Canola Producers Commission	11,250
Etiology and Control of Root-Rot Disease of Field Pea • to develop an integrated control program for root-rot disease complex in Alberta and Saskatchewan by surveying the incidence and severity of the root-rot disease; identifying the pathogens; and evaluating the efficiency of fungicide and integrated fungicide-biocontrol agent seed treatments.	S.F. Hwang	Alberta Environment Centre *Vegreville*	Saskatchewan Agriculture Development Fund	7,650
Adaptation of New Bromegrass Types to Alfalfa-Grass Mixtures • to improve the yield and longevity of alfalfa/bromegrass mixtures adapted to central and northern Alberta identifying suitable traits of bromegrass and high yielding alfalfa/bromegrass combinations.	V.S. Baron	Agriculture Canada *Lacombe*	Western Grains Research Foundation	10,000
Improving Animal Welfare in Intensely Raised Hogs Using a Combined Electrolyte and Environment Enrichment Treatment • to produce and test the formulation of consumable magnesium aspartate mineral block for the reduction of stress and improve meat quality in stress susceptible pigs.	A.L. Schaefer	Agriculture Canada *Lacombe*	Verlapharm Company, Double L Group	15,000
Development of a *Streptococcus* suis Type II Animal Model and Testing of Vaccine Components • to develop a challenge model in pigs to reproduce the clinical symptoms, pathological features and general disease progression of *S. suis* infections; prepare sub-unit vaccines using extracts of *S. suis* bacteria and current bio-techniques; and test the vaccines' ability to protect pigs from developing *S. suis* disease.	P. Willson	Veterinary Infectious Disease Organization *Saskatoon*	British Columbia Pork, Saskatchewan Pork, Alberta Pork Producers Development Corporation, Manitoba Pork est.	36,500
Bovine Herpesvirus-1 Immune Suppression: Characterization of Viral Components, Immune Cells and Soluble Mediators Involved • to confirm that bovine herpesvirus (BHV-1) causes immune suppression, identify immune suppressive components of BHV-1, develop vaccines that are not immune suppressive and define the mechanisms of immune suppression in cattle.	S. van Drunen Littel-van den Hurk	Veterinary Infectious Disease Organization *Saskatoon*	Cattle Marketing Deductions Fund	47,480
A Study of Mortality, Egg Quality and Egg Production in Alberta Table Egg Production Units • to determine the pattern of mortality in commercial egg-type flocks by characterizing normal mortality as well as losses due to disease, monitor the efficiency of Alberta table egg production industry and examine the time and course of events concerning egg shell quality and skeletal system integrity in individually cased hens.	F.E. Robinson	University of Alberta *Edmonton*	Alberta Egg Producers Board	12,000

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
Enhancement of Low Temperature Germination in *Brassica napus* cv. Westar • to assess the impact of low temperature on seed germination in *Brassica napus* cv. Westar and to determine the characteristics within the seed that confer superiority in this regard.	A.M. Johnson-Flanagan	University of Alberta *Edmonton*	Alberta Canola Producers Commission, S.M. Blair Scholarship	20,000
Use of Biotechnology to Relate Pod and Seed Size, Quality Traits, and Yield in Canola • to study the inheritance of large pods and large seeds, determine the interrelationships of pod and seed size to oil and protein content of the various genetic combinations and relate pod and seed size to total seed yield.	S.R. Stringam	University of Alberta *Edmonton*	Alberta Wheat Pool	10,000
Establishing a Spring Wheat Database for Modelling Interaction Between Climate, Varieties and Production Systems • to study the developmental physiology of some W. Canadian spring wheat genotypes to determine varietal features required for breeding early maturing and high yielding varieties, determine the heat unit requirements and acquire a multi year computerized data base to relate heat unit accumulation to the rates and duration of leaf and tiller development and yield component under field conditions.	K.G. Briggs	University of Alberta *Edmonton*	United Grain Growers	6,750
The Use of Acidulated Fatty Acids to Increase the Rumen Undegradable Protein Value of Canola Meal • to evaluate the effectiveness of selected levels of acidulated fatty acids in reducing the rumen degradibility of canola meal protein, effects of acidulated fatty acid treatment of canola meal on the digestion of dietary fiber, development of microbial consortium in vitro and on the gastrointestinal sites of protein and fiber digestion and growth and performance of feedlot cattle.	K.J. Cheng	Agriculture Canada *Lethbridge*	Canola Council of Canada	13,175
Management Practices to Improve Alfalfa Seed Quality and Yield • to develop recommendations to indicate the appropriate stage for desiccation, determine the effects of different desiccants on seed yield and quality and develop a program for the control of quackgrass and Canada thistle in alfalfa grown for seed production.	J.R. Moyer	Agriculture Canada *Lethbridge*	Alberta Alfalfa Seed Committee	5,000
Supplementation of High-Producing Dairy Cows with Rumen Protected Amino Acids to Improve Production Efficiency • to determine the production response and optimum period of feeding rumen protected amino acid mixtures to lactating dairy cows and the ruminal escape rate of unprotected amino acid mixtures.	L.M. Rode	Agriculture Canada *Lethbridge*	Ajinomoto Co.	43,000
Investigations Into the Use of the Fungus *Beauveria bassiana* for Control of Grasshoppers in Alberta • to evaluate the potential of *Beauveria bassiana* for the control of grasshoppers by studying the dose-time-mortality relationship, identifying the most promising strains, and selecting the most effective method for host targeting and field application.	M. Goettel	Agriculture Canada *Lethbridge*	Office of International Co-operation and Development (USDA), Mycotech	19,746

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
Development and Testing of Protective Garments for Agricultural Users of Anhydrous Ammonia • to develop a functional garment or garment system to protect those handling anhydrous ammonia for chemical skin burns and cryogenic effects.	E.M. Crown	University of Alberta *Edmonton*	Esso Petroleum Canada	8,486
Biological Control of the Russian Wheat Aphid • to determine the biological attributes and the role of native and imported natural enemies for the control of Russian wheat aphid.	D.S. Yu	Agriculture Canada *Lethbridge*	Western Grains Research Foundation	30,000
Regulation of Wheat Digestion to Enhance the Growth Performance of Feedlot Cattle • to develop physical and chemical methods to regulate the rate of wheat fermentation and reduce the occurrence of digestive disturbances and enhance the performance of cattle fed wheat.	K.J. Cheng	Agriculture Canada *Lethbridge*	Saskatchewan Wheat Pool	20,000
Identification of the Optimal Dietary Protein Level for Pigs Treated with Porcine Somatotropin (rPst) • to establish ^{15}N urea and ^{13}N d keto iscocaproic acid (KIC) production rates and measure protein aurnover and optimum inclusion levels of protein/lysine in the diets of rPst treated lean pigs using isotopic tracer kinetic end product method.	A.L. Schaefer	Agriculture Canada *Lacombe*	Monsanto	14,442
Alfalfa Rejuvenation using Pressure-Injected Liquid Phosphate Fertilizer and PB-50 Inoculum • to compare the effectiveness of pressure injected liquid P application along with PB-50 with the broadcast and knifing methods by measuring treatments effect on yield and nutrient content of established alfalfa stand and on N fixation and compare the economics of the treatments in terms of costs and benefits.	J. Ashworth	Norwest Soil Research *Edmonton*	Norwest Labs	15,000
Evaluation of Oligolysis for Odour Control Under Laboratory and Field Conditions • to test the effectiveness of oligolysis using three different current levels to control odour in confined livestock operations.	J. Feddes	University of Alberta *Edmonton*	Alberta Pork Producers Development Corporation	12,000
Production Trends in Western Canada's Feed Industry • to indicate the quantity of feed manufactured in the Canadian prairies by the livestock species, the capacity of the Alberta feed manufacturing plants and trends in changes to the structure of the industry.	A.W. Anderson	University of Alberta *Edmonton*	Canadian Feed Industry Association	3,000
Evaluation of Ovine Footrot Vaccine for Prevention and Treatment of Disease • to evaluate the ability of a commercial footrot vaccine in preventing and in treating ovine footrot in Alberta.	M.E. Olson	University of Calgary *Calgary*	Coopers Agropharm Inc.	10,000
Split Nitrogen Application to Improve Oat Quality and Yield • to determine the optimum rates, most effective method and timing of split N application including the effect of chloride, fungicide and plant growth regulator on oat yield and quality.	E. Solberg	Alberta Agriculture *Edmonton*	Cargill Limited	23,400

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
Copper Deficiency: Diagnosis, Crops, Symptoms, Disease, Fertilizers • to determine the relative sensitivity of crop and variety to copper deficiency, identify accurate deficiency symptoms and determine most economic rate and effective method of copper fertilizer application including crop response to residual copper.	E. Solberg	Alberta Agriculture *Edmonton*	Esso Chemical Canada, Cominco Fertilizers, Sherritt Gordon Limited	18,750
Breeding Honey Bee for Tracheal Mite Resistance • to breed lines of bee that are resistant to tracheal mites; test their efficiency in honey production; resistance to other diseases; adaptation to Canadian winters; and study the effectiveness of miticides and vegetable oil in controlling mites.	G.W. Otis	University of Guelph *Ontario*	Ontario Ministry of Agriculture and Food	50,000
Protein Creep Feeds for Nursing Beef Calves • to determine the effects and feasibility of feeding supplemental energy in combination with rumen degradable and undegradable intake protein during the pre-weaning period on growth and mammary gland development of calves, as well as milk production and intake of cows.	R.C. Bailey	Agriculture Canada *Lethbridge*	Canola Council of Canada	35,800
RESOURCE CONSERVATION				
Determination of the Optimum Seedbed Conditions for Flax and Canola • to study the requirements for producing an optimum seedbed for flax and canola; and to investigate the relationship between the moisture gradient in the soil and seeding depth.	K. Domier	University of Alberta *Edmonton*	The Alberta Canola Producers Commission, The Flax Council of Canada	15,000
Development of an Alfalfa Inoculant for Improved Nodulation and Nitrogen Fixation at Low Soil Temperatures • to select strains of *Rhizobium meliloti* and develop rhizobium delivery systems capable of improved nodulation and nitrogen fixation at low soil temperatures.	W. Rice	Agriculture Canada *Beaverlodge*	Philom Bios	69,750
Influence of Climatic Factors on Forage and Crop Production at Sites in East Central Alberta • to measure precipitation, evaporation, soil moisture and temperature; and to monitor the influence of these factors on forage and crop production.	D. Westerlund	Chinook Applied Research Association *Oyen*	Chinook Applied Research Association, Atmospheric Environment Service	4,542
Evaluation of Coated Urea and Development of New Efficient Time-Released N Materials • to investigate if crop nitrogen (N) uptake efficiency can be improved by coating conventional N fertilizer granules with new time-released materials; and to study if the amount of crop-available N derived from soil for spring-sown crops is greater if the release of available N from the soil is suppressed during the previous fall and winter.	M. Nyborg	University of Alberta *Edmonton*	Esso Chemical Canada	11,300

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
Effects of Physical Properties and Nitrogen Mineralization Potentials of Artificially Eroded Soil on Crop Productivity • to study the effects of artificially eroded soil on its physical and chemical properties as well as the influence of the modified properties on crop productivity.	R.C. Izaurralde	University of Alberta *Edmonton*	Western Grains Research Foundation	23,089
Field Evaluation of Laboratory Tests for Soil Phosphorus • to evaluate wheat, barley and canola responses to P fertilizer and determine the ability of various soil test P methods to accurately predict their responses and identify ideal response time.	R.H. McKenzie	Alberta Agriculture *Lethbridge*	Alberta Canola Producers Commission, Western Grains Research Foundation, Sherritt Gordon Limited, Cominco Fertilizers, Esso Chemical Canada, Western Co-operative Fertilizers	52,000
Preliminary Evaluation of Point-Injection for Application of P and K to Forage Grasses in Southern Alberta • to determine the potential benefits of point-injection for the enhancement of fertilizer P and K by forage grass under controlled conditions.	H.H. Janzen	Agriculture Canada *Lethbridge*	Potash and Phosphate Institute of Canada	4,750
Evaluation of Artificial Windbreaks Under Southern Alberta's Chinook Conditions • to quantify the effect of windbreak porosity on the windspeed, turbulence reduction and soil moisture recharge pattern in the shelter as well as characterizing the effect of three sheltered environments on the growth and stress levels of spring wheat.	D.J. Major	Agriculture Canada *Lethbridge*	Wind and Sun Protection	7,450
Liquid Manure Disposal Using a Pulse-Bander for Subsoil Placement • to compare the effectiveness of liquid manure application using pulse-bander as opposed to conventional method by measuring yields, ammonia emission and depth of manure penetration.	J. Ashworth	Norwest Soil Research Labs *Edmonton*	Norwest Labs	8,000
Seedbed Preparation for Canola • to compare seedbed prepared for canola on various soil types using several tillage and seeding operations by measuring aggregate size, soil moisture, compactness, emergence and yield data.	K.W. Domier	University of Alberta *Edmonton*	Alberta Canola Producers Commission, Canola Council	15,000
Investigation of the Management of an Irrigation Canal • to improve water conservation and services to farmers by studying the current and selecting, implementing and assessing the improved management strategies for an irrigation canal.	P.G. McCornick	University of Alberta *Edmonton*	Eastern Irrigation District	5,500
Improving the Efficiency of Urea Fertilizer N • to evaluate the performances of a nitrification and urea inhibitor under controlled environment and field conditions by measuring their effects on crop growth, yield and quality.	E. Solberg	Alberta Agriculture *Edmonton*	Sherritt Gordon Limited	11,250

Project Title and Objective	Researcher	Institution and *Location*	Other Sponsors	AARI Funding 1990-91
Relative Efficiency of Acid and Granulated Phosphorus Fertilizers • to conduct laboratory, greenhouse and field experiments investigating relative performance of various rates of acid granulated P sources, compare crop responses as well as evaluating the influence of micronutrient application on P availability.	E. Solberg	Alberta Agriculture *Edmonton*	Sherritt Gordon Limited	12,500
Evaluation of New Elemental Sulphur Fertilizers • to conduct greenhouse and field experiments examining the effects of two new sources of sulphur and their placement on crop utilization, and compare the effectiveness of the new products with the existing S-products and ammonium sulphate.	E. Solberg	Alberta Agriculture *Edmonton*	Sulchem Products	19,500
Correction of N and S Deficiency with Past Seeded Fertilizer • to determine the response of canola to broadcast, foliar and injected applications of N and S and develop criteria for predicting potential N and S deficiencies at an early growth stage.	E. Solberg	Alberta Agriculture *Edmonton*	Alberta Canola Producers Commission	13,750

FINANCIAL STATEMENTS

MARCH 31, 1991

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AUDITOR'S REPORT

ALBERTA LEGISLATURE

OFFICE OF THE AUDITOR GENERAL

To the Members of the Board of the
Alberta Agricultural Research Institute

I have audited the balance sheet of the Alberta Agricultural Research Institute as at March 31, 1991 and the statement of revenue, expenditure and unexpended funds for the year then ended. These financial statements are the responsibility of the Institute's management. My responsibility is to express an opinion on these financial statements based on my audit.

I conducted my audit in accordance with generally accepted auditing standards. Those standards require that I plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In my opinion, these financial statements present fairly, in all material respects, the financial position of the Institute as at March 31, 1991 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles.

Donald D. Salmon

Edmonton, Alberta
August 9, 1991

FCA
Auditor General

BALANCE SHEET AS AT MARCH 31, 1991

ASSETS	1991	1990
Cash	$2,498,893	$1,504,926
Accounts receivable:		
•Due from Government of Canada	722,854	717,389
•Due from Province of Alberta	14,295	—
	$3,236,042	$2,222,315

LIABILITIES AND UNEXPENDED FUNDS

Accounts payable and unearned revenue	$1,962,007	$1,326,259
Unexpended funds	1,274,035	896,056
	$3,236,042	$2,222,315

The accompanying notes are part of these financial statements.

OFFICE OF THE AUDITOR GENERAL

STATEMENT OF REVENUE, EXPENDITURE AND UNEXPENDED FUNDS FOR THE YEAR ENDED MARCH 31, 1991

REVENUE

	1991	1990
Contributions from the General Revenue Fund *(Note 4)*	$1,000,000	$ –
Contributions from the Government of Canada *(Note 5)*:		
•Western Diversification Program	1,000,000	1,000,000
•Solar Energy Research and Development Program	338	67,232
Canada/Alberta Soil Conservation Initiative	375,000	–
Interest	273,474	215,988
Contributions from industry	142,288	47,691
Administration fees on contracted research	4,102	4,970
Grant from the Alberta Heritage Savings Trust Fund	682	12,833
	2,795,884	1,348,714

EXPENDITURE

Research Grants	1,908,083	1,200,969
Administered awards	192,757	196,500
Administration expenses	173,757	121,750
Industry sponsored research *(Note 6)*	142,288	47,691
Farming for the Future program conference costs	682	12,833
Solar Energy Research and Development Program *(Note 6)*	338	67,232
	2,417,905	1,646,975
Excess (deficiency) of revenue over expenditure	377,979	(298,261)
Unexpended funds at beginning of year before restatement	896,056	1,649,212
Adjustment for research grants and administered awards *(Note 3)*	–	(454,895)
Unexpended funds at beginning of year after restatement	896,056	1,194,317
Unexpended funds at end of year	$1,274,035	$ 896,056

OFFICE OF THE AUDITOR GENERAL

NOTES TO THE FINANCIAL STATEMENTS MARCH 31, 1991

NOTE 1

Authority

The Alberta Agricultural Research Institute operates as a provincial corporation under the authority of the Alberta Agricultural Research Institute Act, Chapter A-13.7, 1987, Statutes of Alberta 1987 as amended.

NOTE 2

Significant Accounting Policies

Research Grants

Research grants are recorded when approved for payment by the Board of Directors.

Unexpended balances of grant funds held in researchers' accounts are not reflected in these financial statements.

Contributions from Industry

Contributions from industry represent cash donations to the Institute for specific research projects and do not include donations in-kind.

Administration Expenses

Certain salaries and other overhead costs, as well as accommodation costs incurred in the administration of the Institute, are borne by the General Revenue Fund and are not reflected in these financial statements.

Changes in Financial Position

A statement of changes in financial position is not provided as disclosure in these financial statements is considered to be adequate.

NOTE 3

Change in Accounting Policy for Research Grants and Administered Awards

The Institute has changed the way that it accounts for research grants and administered awards. Under the new policy, research grants and awards are accounted for as expenditure when the grant application is approved by the Institute's Board of Directors. Previously, these grants and awards were not accounted for as expenditure until the researcher indicated willingness to accept the conditions imposed by the grant agreement.

This change in accounting policy has been applied retroactively, which necessitated the following restatements of the 1990 comparative figures.

	Previously Reported	Adjustment	As Restated
Accounts payable and unearned revenue	$ 496,852	$ 829,407	$1,326,259
Unexpended funds	$1,725,463	$(829,407)	$ 896,056
Research grants and administered awards	$1,022,957	$ 374,512	$1,397,469
Excess (deficiency) of revenue over expenditure	$ 76,251	$(374,512)	$ (298,261)

If the Institute had continued to account for research grants and awards under its previous policy, unexpended funds at March 31, 1991 would have been $2,944,028, and the excess of revenue over expenditure for the year then ended would have been $1,218,565.

NOTE 4

Contributions from the General Revenue Fund

Contributions from the General Revenue Fund are subject to the approval of annual appropriations. The Institute may be required to refund unexpended portions of contributions held at the end of a fiscal year.

NOTE 5

Contributions from the Government of Canada

Contributions from the Government of Canada are subject to the approval of annual appropriations. Pursuant to an agreement between the Government of Canada's Department of Western Economic Diversification, the Government of Alberta, and the Alberta Agricultural Research Institute, Canada agreed to make non-repayable contributions to the Institute for agricultural research activities totalling $4,000,000. The following contributions have yet to be received:

1991-92	1,000,000
1992-93	450,000

NOTE 6

Sponsored Research

Specific research projects are carried out in co-operation with Alberta Agriculture researchers for Industry and other Government sponsors.

NOTE 7

Comparative Figures

The 1990 figures have been reclassified where necessary to conform to 1991 presentation.

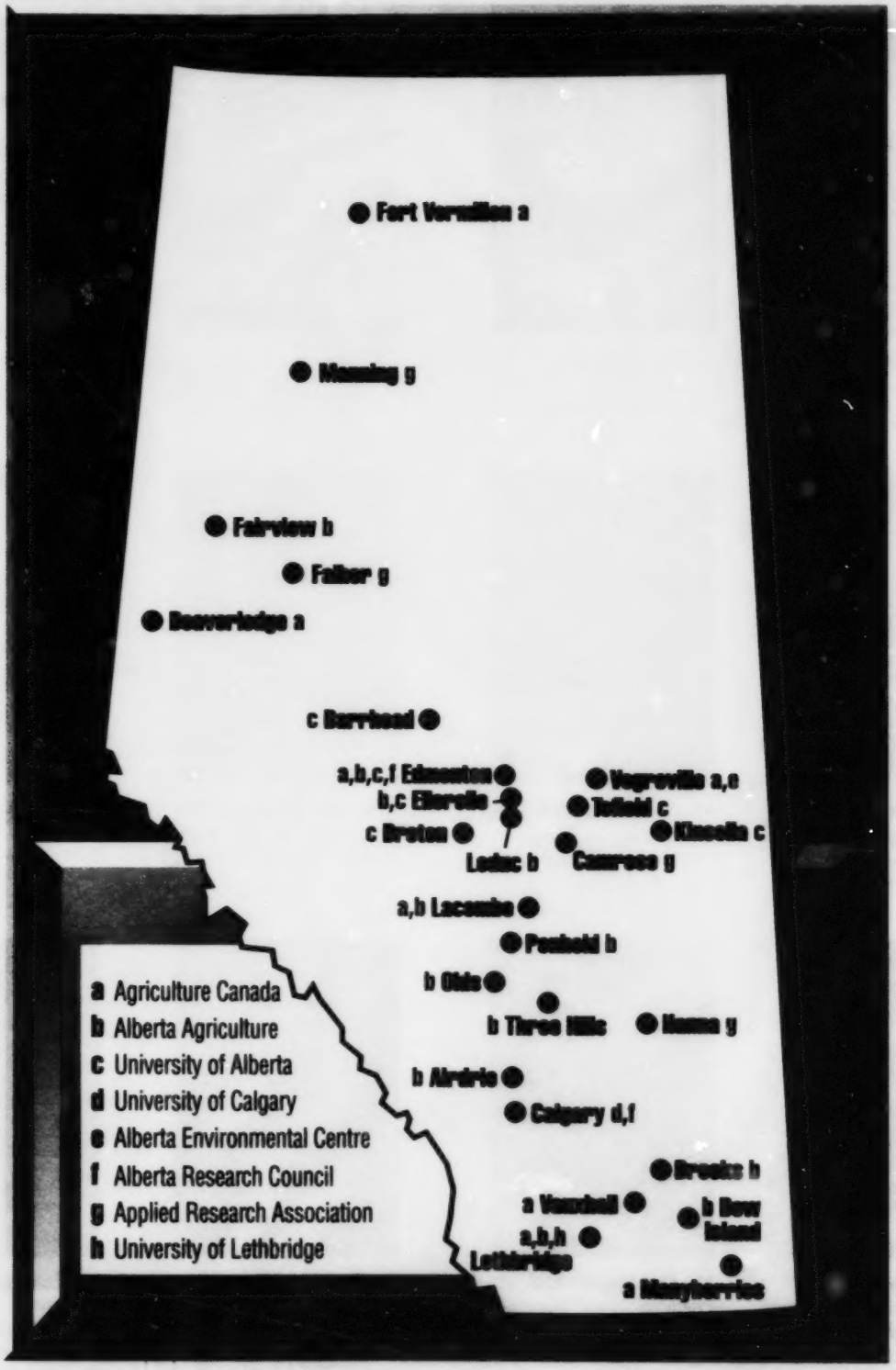
NOTE 8

Approval of Financial Statements

These financial statements were approved by management.

OFFICE OF THE AUDITOR GENERAL

Agricultural Research Facilities in Alberta



BOARD OF DIRECTORS

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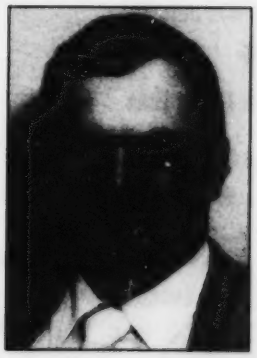

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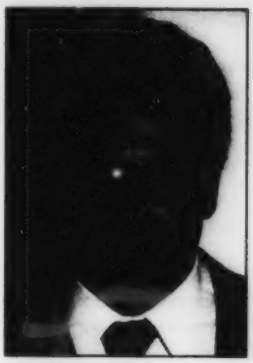

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* These committee members reviewed the applications submitted under the Matching Grants Program and the Research Coordination Program for the 1990-91 fiscal year. New committees shown on Pages 6 and 7 were put into operation in November 1990.